WHAT IS CLAIMED IS:

1. A method, comprising:

sensing a cardiac signal;

computing curvatures at sample points X_1, X_2, $X_{3, \ldots\ldots}$ X_I on the sensed cardiac signal;

extracting features from the computed curvatures;

comparing the extracted features with a set of predetermined templates; and

classifying the cardiac signal based on an outcome of the comparison.

2. The method of claim 1, wherein the cardiac signal comprises sensing complexes in real time, wherein the complexes are cardiac cycles.

3. The method of claim 2, wherein computing the curvatures at sample points X_1, X_2, $X_{3, \ldots\ldots}$ X_I comprises computing curvatures at the sample points X_1, X_2, $X_{3, \ldots\ldots}$ X_I by fitting a cubic least square error curve to sensed complexes on the cardiac signal, wherein the sample points have a predetermined interval of time between adjacent sample points.

4. The method of claim 3, wherein computing the curvatures at sample points X_1, X_2, $X_{3, \ldots\ldots}$ X_I comprises fitting a cubic least square error curve around a sample point by using N number of sample points to fit the cubic least square error curve, wherein N is an odd number greater than or equal to 5.

5. The method of claim 4, wherein computing the curvature at the sample point using the N number of sample points comprises using the sample point as a mid point of the N number of sample points.

6. The method of claim 5, wherein computing the curvature (K) at a sample point X_I of the cardiac signal when using 5 sample points to fit the cubic least square error curve, is based on

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$$K = (2C_I/(1+B_I^2)^{3/2})$$

where

$$B_I = T_1Y(I-2) + T_2Y(I-1) + T_3Y(I) +.T_4Y(I+1) + T_5Y(I+2)$$

$$C_I = S_1Y(I-2) + S_2Y(I-2) + S_3Y(I) + S_4Y(I+1) + S_5Y(I+2)$$

where S and T are constants.

7. The method of claim 6, wherein computing the curvature comprises computing an average curvature between two adjacent sample points based on a linear interpolation of the B_I and C_I between two adjacent points and integrating the computed curvatures between the two adjacent sample points X_1, X_2, $X_{3,}$ .... X_I.

8. The method of claim 3, wherein extracting the features further comprises:

extracting features from the computed curvatures is based on comparing the computed curvatures to a set of predetermined threshold values; and

identifying and separating a set of extracted features associated with the first complex upon detecting a second subsequent complex from the sensed cardiac signal.

9. The method of claim 8, wherein the set of predetermined threshold values are based on a previous curvature value, a first curvature value, and a curvature threshold limit.

10. The method of claim 9, wherein separating the set of extracted features comprises separating the set of features based on identifying features associated with the first complex having a predetermined time earlier than the detected second subsequent complex.

11. The method of claim 8, wherein comparing the extracted features comprises comparing the separated set of extracted features associated with the first complex with a set of predetermined templates.

12. The method of claim 11, wherein comparing the extracted features further comprises:

identifying a fiducial feature from the set of separated features associated with the first complex based on a predetermined deviation value; and

aligning the set of separated features associated using the identified fiducial feature.

13. The method of claim 12, wherein the predetermined deviation value is based on a sample point having an amplitude farthest from a predetermined reference point.

14. The method of claim 13, further includes repeating the above steps for a real-time classification of heat beat signals from the sensed cardiac signal.

15. The method of claim 13, wherein the feature is defined by one or more metrics.

16. The method of claim 15, wherein the one or more metrics are area under a computed curvature, a time of centroid of the area, and a value of original signal amplitude at a time of the centroid of the area.

17. The method of claim 13, wherein comparing the set of features comprises comparing the set of features associated with the first complex with one or more predetermined heart beat signals.

18. The method of claim 8, wherein the predetermined set of templates comprises one or more predetermined template zones defined by a center time, a center amplitude, a time width, and an amplitude width.

19. The method of claim 1, further comprises providing a therapy to a heart based on the outcome of the classification.

20. The method of claim 1, further comprises guiding a therapy to a heart based on the outcome of the classification.

21. The method of claim 1, further comprises storing classifications for diagnostic purposes.

22. The method of claim 1, wherein computing the curvature further comprises permitting the computed curvature signal to have a variable gain that adapts according to the changes in sensed cardiac signal.

23. A cardiac rhythm management system, comprising:

at least one electrode;

a signal sensing circuit coupled to the electrode to sense a cardiac signal;

a controller coupled to the sensing circuit, wherein the controller receives the sensed cardiac signal, and wherein the controller includes:

an analyzer, to compute curvatures at sample points X_1, X_2, $X_{3,}$ .... X_I on the sensed cardiac signal, wherein the analyzer extracts features by comparing the computed curvatures to a set of predetermined threshold values; and

a comparator, coupled to the analyzer, compares the extracted features with a set of predetermined templates, and classifies the sensed cardiac signal based on the outcome of the comparison.

24. The system of claim 23, wherein the sensing the cardiac signal includes sensing complexes on a real-time basis, wherein the complexes comprise heart beat signals.

25. The system of claim 23, wherein computing curvatures comprises computing curvatures at the sample points X_1, X_2, $X_{3,}$ .... X_I by fitting a cubic least square error curve to a first complex of the sensed cardiac signal using an N sample points to fit the cubic least square error curve, wherein the analyzer extracts features of the first complex by comparing the computed curvatures of the first complex to a set of predetermined

threshold values, and wherein the analyzer further separates a set of features associated with the first complex upon detecting a second subsequent complex from the sensed cardiac signal; and wherein the comparator compares the aligned set of features associated with the second subsequent complex with a set of predetermined templates, and classifies the first complex based on the outcome of the comparison.

26. The system of claim 25, wherein the comparator issues a command signal based on the outcome of the classification.

27. The system of claim 26, further comprises a therapy circuit, coupled to the comparator, to deliver electrical energy through the at least one electrode upon receiving the command signal from the comparator.

28. The system of claim 27, wherein the electrical energy is a pacing pulse electrical energy.

29. The system of claim 25, wherein the set of predetermined threshold values are based on a previous curvature value, a curvature value, and a curvature threshold limit.

30. The system of claim 25, wherein the analyzer further identifies a fiducial feature from the set of separated features associated with the first complex based on a predetermined deviation value, and further aligns the set of separated features associated with the first complex with respect to the identified fiducial feature.

31. The system of claim 30, wherein the analyzer separates the set of features associated with a first complex based on a predetermined time earlier than the detected second subsequent complex.

32. The system of claim 31, wherein the predetermined deviation value is based on a sample point having an amplitude farthest from a predetermined reference point.

33. The system of claim 25, wherein N is an odd number greater than or equal to 5.

34. The system of claim 33, wherein the computing curvature comprises computing curvature at a mid point of the N number of sample points.

35. The system of claim 34, wherein the analyzer computes the curvature (K) at a sample point X_I on the cardiac signal when using 5 sample points to fit the cubic least square error curve, based on

$$K = (2C_I/(1+B_I^2)^{3/2})$$

where

$B_I = T_1Y(I-2) + T_2Y(I-1) + T_3Y(I) +.T_4Y(I+1) + T_5Y(I+2)$

$C_I = S_1Y(I-2) + S_2Y(I-2) + S_3Y(I) + S_4Y(I+1) + S_5Y(I+2)$

where S and T are constants.

36. The system of claim 35, wherein the analyzer computes an average curvature between two adjacent sample points based on linear interpolation of the B_I and C_I between two adjacent points and integrating the computed curvatures between the two adjacent sample points.

37. The system of claim 25, wherein the analyzer further comprises a variable gain, wherein the variable gain adapts according to changes in the sensed cardiac signal.

38. The system of claim 25, wherein the at least one electrode is disposed in or around a heart.

39. The system of claim 25, further comprises a memory to store the extracted features of the first complex.

40. The system of claim 39, wherein the memory further stores the classified first complexes for diagnostic purposes.

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